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Open Government Data: Initiatives, Challenges, and Myths

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Abstract

The study has been carried out to identify the open data initiatives taken by different governments. The study also incorporated the benefits and challenges and myths of open data applications. It is a qualitative study based on the review of already published literature. Literature was searched from scholarly databases by using multiple keywords. Articles were selected based on relevance to the topic. The UK, US, Maldova, Pakistan, and Fingal Country Catalog cases have been elaborated. The challenges include technical, legal, organizational, managerial, financial, methodological, and conceptual issues. The myths of open data include; 1) All information should be unrestrictedly publicized, 2) It is a matter of merely publishing public

data, 3) Every constituent can make use of open data, 4) Open data will result in open government. It will help report already taken initiatives and encountered challenges to better tackle initiatives taken by novice organizations. The organizations planning to adopt linked and open data technologies can overview issues and challenges and benefit from the best practices. This study is one of its kind as assembling open data technologies based on evidence from the literature is not presented before the current study.

Keywords: Open Data, Open Government Data (OGD), OGD Initiatives, OGD Challenges, OGD Myths

Introduction

The idea of Linked Data (LD) is getting fame for connecting online data with unique identification for all entities. This includes linking data to become readable and useable by humans and computers and all related datasets. Open data is defined as "non-privacy-restricted, and no confidential data produced with public money and is made available without any restrictions on its usage or distribution" (Janssen, Charalabidis & Zuiderwijk 2012). Open government data has been defined as "an information policy which provides a particular framework for governing the re-use by third parties of datasets that are produced by public institutions" (Bates, 2014, p. 390). OGD is mainly motivated by two movements; "right to information" and "Open Government Data." The right to information is initiated to provide open access to the public by considering their rights from the human rights perspective (Ubaldi, 2013). Saxena and Muhammad (2018) defined it as "open government data refers to making public sector information freely available in open formats and ways that enable public access and facilitate exploitation."

Open data and government data has two domains of open government data. Open data means every kind of data published on the internet, available for everyone to access, free use, re-use, and redistribute to fulfill the required information. In open government data, different organizations/institutions/agencies published their data on the community's net, i.e., social work, industry, tourism, education, climate change, transport, health, etc. (Borglund, & Engvall, 2014). Ding, Peristeras, and Hausenblas (2012) mentioned three main stages for OGD. (i) Open stage: government facilitates its citizens to re-use information from OGD (ii) Linkage Stage: academic and other organizations link their data through machine processing with external links and different vocabularies. In the third stage, developers made different valuable applications to assemble datasets for multiple purposes. It had been suggested by Susha, Grönlund, and Janssen (2015) that the publishers of data should consider employed different strategies to involve stakeholders. The strategies were user-friendly and user-needed content and format, hitting exact community, managing data processes, developing appropriate communication strategies, organizing users' training, and accommodating users' feedback and offer the necessary support.

Janssen, Charalabidis, and Zuiderwijk (2012) compared the benefits and barriers of Linked Open Government Data (LOGD). In this regard, three categories of benefits were created. Political and social benefits includes transparency, data scrutinization, equality, citizen's empowerment & engagement, improvement in public services and policy-making processes. Economic benefits include collaborative intelligence, improved services, product processes, and overall economic growth. Operational and technical benefits includes re-use of data and avoiding duplication, generating new data based on existing data, fair decision making, consulting external problem-solving processes, and no data loss. Ubaldi (2013) mentioned the benefits of OGD as public transparency, accountability and responsibility of government, detail

of tasks, data openness usually leads to government and public betterment, provide insights of evidence-based data, and be considered a crucial source of economic growth. Moreover, Shadbolt and O'Hara (2013) said that RDF data supports JavaScript, Object Notation, CSV format, and the user could get it without any conversion process.

The essential purpose of publishing Open Government Data (OGD) is to make data accessible and reusable for everyone (Kucera & Chlapek 2014). General growth in government datasets was noticed as Ding, Peristeras, and Hausenblas (2012) added that in January 2012, more than 30 countries (including national and local governments) had contributed to more than 700,0000 Open Government Data (OGD) datasets In 2011, the State of the LOD Cloud report analyzed the adoption of best practices of linked datasets within different topical domains. Schmachtenberg, Bizer and Paulheim, (2014) revisited the results of LOD cloud report and highlighted that that the number of linked datasets has approximately doubled. The encouraging figures showed that most government and publications provide provenance information (origin and quality of source). However, provenance and license metadata is still rarely provided by the data sources.

A systematic review based study has already been published which dealt with approaches, guidelines, challenges, and impacts of publishing and consuming different government datasets and initiatives (Attard, Orlandi, Scerri, & Auer, 2015). Algemili (2016) surveyed to collect data from 138 professionals to infer encountered challenges while transmitting raw data into open government data. A survey-based study carried out by Roa, Loza-Aguirre, and Flores (2019, April) inferred six big problems segregated into pieces that occurred before, during, and after implementing the OGD initiative. Similarly, Çaldağ, Gökalp,

and Gökalp (2019, November) carried out a systematic review based study to present holistic socio-technical benefits and challenges faced by different open government initiatives.

However, the current study focused on analyzing the implementation of open government data. It further highlighted the challenges and myths of open data. The literature-based study will provide an overview of different countries' open data initiatives with the eight principles of Open Government Data. The principles were authored by a working group convened by Carl Malamud on December 8, 2007 in Sebastopol, California. According to these eight principles, the government data shall be considered open if the data complies with the principles. The principles says that the data should be; 1) complete, 2) presented in primary way, 3) presented timely and quickly, 4) accessible to wide range of users, 5) Machine processible, 6) non-discriminatory, 7) Non-proprietary and 8) License-Free. This study will consider the eight principles to review the open data portals of USA, UK, Pakistan, Fingal and Maldova. Additionally this study will also synthesize the challenges and myths relate dto open government data.

Objectives of the Study

The study has been carried out to accomplish the following objectives:

1. To report initiatives of open government data and to compare the open data portals based on the eight principles
2. To highlight the associated challenges in linking open government data
3. To identify the myths of linked open government data

Method

This paper is based on literature research methodology. Lin (2009) defined it as “to read through, analyse and sort literatures in order to identify the essential attribute of materials. The review-based study dealt with relevant literature searched through different databases, e.g., Emerald

Insight, EbscoHost, JStor, Google Scholar, and relevant journals. The researchers used all possible keywords, for example, open government data, public data, linked open government initiatives, challenges of open government data, open data, myths of open government data, barriers of open government data, linked open government data, open government data portals, the framework of open government data, etc. The studies that met the criteria were selected after careful review of abstracts. The websites were consulted for the review of data portals.

Appraisal of Open Government Data Initiatives

The research studies highlighted government initiatives in advanced countries like the USA and UK as Bates (2014) described that by 2009, these governments consider open government data their major concerns of policy initiatives. Also, Ding, Peristeras and Hausenblas (2012) mentioned UK and US government commitment to implement open data. Similarly, it was revealed in European domain as Gomes and Soares (2014) conducted a web content-based study to analyze three northern and three southern European countries' open government initiatives and reported a higher level of datasets were leading towards OGD development.

The initiatives were also taken in African countries as Bello, Akinwande, Jolayemi, and Ibrahim (2016) analyzed OGD implementation in African countries by employing Berners-Lee 5 stars. The overall process was firstly started in 2011. Twenty-two portals were found from 17 African countries, from which 32% implemented *Drupal Tool*. The majority of them (60%) were national initiatives, and Nigeria was the only country with state initiatives. South Africa had two university-level initiatives and one city-level data portal. A specialized data portal, 'Ebola' was initiated by Sierra Leone. Although the efforts were appreciable towards the governmental process's openness and transparency, there was much required to acquire five stars.

However, Corrêa, Paula, Corrêa, da Silva (2017) assessed the compatibility of Brazilian government initiative with OGD principles analyzing 561 municipalities. The government was found unable to implement the national Access to Information Law. It had been found that the majority of data portals were not according to the basic requirements of Brazilian law. Both U.S. and U.K. governments made public commitments toward open data. Similarly, Styrin, Luna-Reyes, and Harrison (2017) worked on similarities and differences among open government ecosystems of Mexico, Russian, and the USA. The differences were found in terms of policy for adopting OGD, performance in terms of data quality, and implementation process. However, the interesting similarity was that the general public of the three countries was found unskillful in approaching OGD.

Willmers, Schalkwyk, and Schonwetter (2015) analyzed two African OGD initiatives of Kenya and the South African city of Cape Town, especially keeping in view the licensing status and data openness. The study revealed content licensing, licensing compatibility, and lack of clarity of third-party engagement as some issues. Donald and Saxena (2019) conducted a qualitative study to incorporate public and private stakeholders' views about the Tanzanian OGD initiative. The significant issues recorded were organizational, legal, social, and technical. Furthermore, government institutions were hesitant to publish their datasets. Bvuma and Joseph (2019) added that South Africa is initiating and publishing datasets, especially at the local government level, to cope with the increasing corruption and inefficiency among government institutions. However, the local government faced swearing challenges of finances, lack of capability to deliver, and officials' inability to ensure regulations.

In December 2007, 30 open government advocates developed a set of principles of Open Government Data. Even though their guidelines are not legally binding, they are considered to be

widely accepted among the Open Government Data community. In order to be fully "open", data must have the qualities (given in Table 1). Below is given a tabular analysis of selected five data portals: UK OGD Portal, USA OGD Portal, Maldova OGD Portal, Fingal Country Catalog and Open Data Portal Pakistan.

Principles	**U.K. OGDP**	**USA OGDP**	**Maldova OGDP**	**Fingal OGDP**	**Pakistan OGDP**
Complete (in the broadest sense of the word)	Yes	Yes	Yes	Yes	Yes
Primary (collected at the source), timely (i.e. Open as quickly as possible)	Yes	Yes	Yes	Yes	Yes
Accessible (to the widest range of users and for the widest range of purposes)	Yes	Yes	Yes	Yes	Yes
Machine-readable (can be processed in an automated way)	Yes	Yes	Yes	Yes	Yes
Non-discriminatory (available to anyone, no registration requirement)	Yes	Yes	Yes	Yes	Yes
Non-proprietary (available in an open format)	Yes	Yes	Yes	Yes	Yes
License-free (not subject to intellectual property rights)	Yes	Yes	Yes	Yes	Yes
Permanent (findable over time)	Yes	Yes	Yes	Yes	Yes
As costless as possible (as usage costs are one of the greatest barriers to access).	Yes	Yes	Yes	Yes	Yes

U.K. Open Government Data Portal: In 2009, the United Kingdom's government digital service had initiated the public website portal (**http://data.gov.uk**) to find out varied forms of information to fulfill the information need of people, organizations, and agencies. This web portal was started with more than a thousand databases from seven government departments, but the web portal had increased its datasets up to 33184 datasets. The web portal datasets include

major organizations, i.e., Business and Economy, Crime and Justice, Defense, Education, Environment, Government, Government Spending, Health, Mapping, Society, Towns and Cities, Transport etc. Vancauwenberghe and van Loenen (2019) analyzed the shift of governance and infrastructural change towards more open – SDI in the UK in past ten years. The UK government had applied 'government instruments' and introduced new instruments and replaced or eliminated old ones. However, a big challenge of alignment between spatial data and open data occurred, but the UK government seemed successful in tackling it.

U.S. Open Government Data Portal: USA government began an open government data portal (www.data.gov), the federal government's open data site developed in 2009. The main purpose of this portal was to make government more transparent and accountable in its policies. Open government data increased citizen participation in government, created economic development opportunities, and constituted informed decision-making in private and public sectors. USA's open government data portal provided information about development, decision-making, and the public and private sectors' economy to American citizens. USA's OGD portal contains 218,727 documents by Federal, state and local, and city governments in multiple formats (HTML, PDF, XML, and ZIP) covering agriculture, climate, energy, local government, maritime, ocean, older adults' health.

Maldova Government Open Data Portal: Maldova Government Open Data Portal (MGODP) given its user the chance to access and search relevant information through www.data.gov.md freely. The facility to download and re-use of relevant information from an open government data portal was also provided. It would be helpful to make government data more transparent, productive, and accountable to general public and public institutions. Maldova, an open government data portal significant step that played role in betterment of governance, e-

transformation, and free access to common citizens to the data that linked central public administration authorities. Portal consisted of 17 different kinds of groups, i.e., health, public health institutions, hospital, education, culture, crimes, students, schools, transport, report, budget etc. Total 1138 datasets were found from different organizations and ministries including education, agriculture, society, economics, transport, culture, crime, and justice.

Fingal Country Catalog: Fingal, Ireland, had initiated open data to ensure public engagement, collaboration, and transparency, making data available in CSV, XML, and KML formats. Firstly, the data were converted into CSV based data on RDF following the Dcat model and using UK-based Integrated Public Sector Vocabulary (ISPV). Secondly, data cleaning was done using Google Refine. Thirdly, URIs were assigned under data-gov.ie, dividing data based on Fingal Country Council. Fourthly, Data Cube Vocabulary was employed to provide a general understanding of the data, and finally, the 296 datasets of different categories like Arts, Culture and Heritage, Citizen Participation, Demographics, Economy, education, Environment, Housing, Misc, Public Health, Public Safety, Recreation, Technology, Transportation and Infrastructure, Zoning and Land Use, were published using CKAN Extension. The data were loaded in SPARQL, and endpoints were provided using Fuseki (Maali, Cyganiak, & Peristeras, 2012).

Pakistan Data Portal: Open data portal, Pakistan (https://opendata.com.pk/), is one of the advanced open data portals aimed to provide a standardized platform for sharing information. The portal also aimed to unlock the value of data by analyzing it in machine-readable and open formats. Open Data Pakistan was developed in consortia of National Center for Big Data and Cloud Computing (NCBC), Lahore University of Management Sciences (LUMS) and Higher Education Commission (HEC), Pakistan. The open data portal's disclaimer promoted the open data culture. The involved organizations uploaded datasets with a proper citation from reports

and websites publicly available online. There are 17 organizations registered in open data Pakistan, i.e., Computer-Human Interaction and Social Experience Lab (CHISEL) atLUMS, Crime Investigation and Prevention Lab (CIPL) at ITU, Energydata.info (The World Bank), Exascale Open Data Analytics Lab at NED University of Engineering and Technology, Friends of Open Data Pakistan, Gallup Pakistan, HEC Pakistan, Knowledge, and Data Engineering (KADE) Lab, Lahore University of Management Sciences (LUMS), National Center in Big Data and Cloud Computing (NCBC), Pakistan Bureau of Statistics, Precision Medicine Lab CECOS University, Predictive Analytics Lab at SZABIST (ISB), Prime Institute, Sustainable Development Policy Institute, The Energy Informatics Group and The Urban Unit. There were 282 datasets found in 14 different categories, i.e., economy and finance, government and public sector, public safety, demography, health, environment and energy, housing and public services, education, cities and regions, agriculture, food and forests, connectivity, culture, manufacturing, and science and technology. The data portal was found updated till 2020.

Challenges of Linking Open Government Data

Organizations and individuals faced so many challenges to linking their data with a single data portal, including incomplete datasets, restrictions to open organizational data, cultural constraints, privacy, legality, confidentiality, sensitivity of information, low quality metadata, un-following of standard procedures while querying in government portals, incompleteness, less reliability, formats issues, lack of resources, transparency issues, duplication of data, timing issues, open access issues, registration issues, data insecurity, licensing, integration of data, less or no awareness of open data, lack of proper planning to utilize the resources, lack of motivation, lack of technological support, lack of organizational processes, policy challenges, lack of knowledge and user's engagement (Attared et al. 2015; Ding, Peristeras & Hausenblas 2012;

Gunnlaugsdottir 2015; Janev et al. 2014; Janssen, Charlabidis & Zuiderwijk 2012; Ubaldi 2013; Gascó-Hernández et al., 2018). Algemili (2016) indicated data selection, data heterogeneity, non-uniform data access, data security, data quality, and data processing as big challenges during the conversion of raw data into open government data projects. Conradie and Choenni highlighted the issues related to the release of data by local government of Netherlands. They highlighted the issues as; Fear of false conclusions; financial effects; Opaque ownership and unknown data locations; and Priority (i.e. local government has more important things to do first). Zuiderwijk, Janssen and Choenni also mentioned four main challenges to the use of open data: Fragmentation of data; Lack of access to data; Lack of interoperability; and Difficulties in processing the data. Another study highlighted twenty barriers related to open data and categorized them in six categories named as: Economic, Technical, Cultural, Legal, Administrative, and Risk related (Barry& Bannister, 2014). Saleem, Butt, and Warraich (2018) elaborated on technical issues (ontologies development; use of multiple standards and languages), legal issue (data protection, the privacy of data), and conceptual issues (lack of awareness, scarce resources to train the practitioners, and issues of publishing data on web). Another study identified the challenges affecting the citizens' satisfaction to use OGD including technological skills, retrieval of data, usability, quality of data, timelines, and accuracy (Warriach, Rasool & Jan, 2019). Saxena (2017) analyzed the implementation of OGD among member countries of the Gulf Cooperation Council (GCC), including Saudi Arabia, Bahrain, Qatar, Oman, United Arab Emirates, and Kuwait and found the challenges in implementation of OGD. The datasets were outdated, available in the inappropriate format, mostly only in Arabic, and not understandable for the outsider, and there were many policies and staff lacking issues. Most importantly, privacy issues occurred as users were discouraged. A recent study of Roa,

Loza-Aguirre, and Flores (2019, April) mentioned six big problems professionals had to face before, during, and after implementing OGD. The problems were ranked according to reported frequency as data quality, policy and legal, organizational, technical, citizens, and economic and financial. Gascó-Hernández, Martin, Reggi, Pyo, and Luna-Reyes (2018) highlighted that users' skills and knowledge regarding OGD is very important to enhance the usage and they can be educated by means of training and engagement initiatives.

Myths about Open Government Data

Bekkers and Homburg (2007) mentioned that myth is just like a double-edged sword because, on one side, myths are pulling to the people for the virtue of concept, but at the same time, it is not true and not having sound evidence to claim some specific concept. Janssen, Charalabidis, and Zuderwijk (2012) described different myths about open government data.

Myth 1: All information should be unrestrictedly publicized

Government departments, organization, and agencies developed their general open data policy for publicizing all the data. However, government institutions face many challenges with this assumption, i.e. (i) there is not any specific mechanism to trace back to the individual to publicized the data due to legislation and privacy (ii) inadequate resources for publishing (iii) the quality of information is poor, confused and less transparent (iv) data structure is complex and difficult to understand (v) and different laws prevent the publication of certain data because of the specific nature of data. However, UK's data portal does not host any dataset directly, and it ensure that datasets are already published on the departmental or national websites. Also, these data portals have restrictions for the personal and sensitive data.

Myth 2: It is a matter of simply publishing public data

Policymakers of different organizations want their data available on the web. They do not care about data origin, enriching, or editing of data. However, OGD is not just publishing the data, it is also about the maintenance, security and usage of that data. This myth challenges data availability with certain issues like i.e., quality of data, modification of data, and raw data processing. Most of all, nobody can access the data without Metadata descriptions, i.e., author, title, publisher, etc. Metadata is essential to take over the hurdles, i.e., searching (by author, title, subject, or year) interpretation. Metadata is to link the data and robust and increase the data accessible to everyone. Dawes and Helbig (2010) mentioned that government faces a large number of criticism about publishing their datasets, i.e., poor usage of data, weak application of principles, feedback, advance mechanisms, and meta-data quality. These criticisms should be taken seriously and make sure that datasets are published on the net and are easy to access and user-friendly.

Myth 3: Every constituent can make use of open data

Available data is easy to use by any of the users is just a myth. Most of the time, users need skills, expertise, and knowledge to use certain datasets. Many datasets (specifically the statistical reports) need a deeper knowledge of to use of data. It may take time and energy to understand and make proper use. This is just a dream that everyone can use available data, and anybody can use the data directly. This might be true for relatively straightforward data or for functions for which easy-to-use software applications have already been developed.

Myth 4: Open data will result in open government

The purpose of providing open government data is to enhance transparency and effective insight of data. It may make the government more answerable to the community as everything is freely available to all. Anybody can access the data and may raise their voice in case of violation.

However, finding the right data and its interpretation is never easy. The data is available in different formats, and majorly these the statistics and reports from the government offices and departments. Hence, the interpretations and conclusions are neither easy and nor readymade. The results and descriptions may vary from person to person.

Conclusion

There is growth in open government data initiatives, specifically with provenance and license information. The governments are providing open data for the public to ensure transparency, accountability, and public engagement. The UK and the USA have taken initiatives to achieve political, economic, and social objectives. They have used RDF Schema and SPARQL as an access point. However, they face problems like poor documentation, the inconsistency of datasets, and inconvenient file formats. Data Portal Pakistan is a most recent advancement regarding open government data from Pakistan's prospect. Open Data Portal is one of the advanced web portals where users can get almost 150 datasets from different formats about different sectors, i.e., Economy & Finance, Health, Demography, Education, Agriculture, Food, Science & Technology, Culture, etc. It has been found that Open Data Portal is a perfect move and, like the first step to making link the government data with a central portal by the joint venture of NCBC, LUMS, and HEC. However, there are many associated challenges; Unavailability of organizational policy, misbalance between public privacy and transparency, no indexing, and application complexity, users remain anonymous, and no licensing leads to data insecurity. However, governments are striving to provide transparent data to the public with joint efforts of government organizations. There should be some standards followed by all organizations contributing to the development of open government data.

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